

Claims

[1] A hydrocarbon reforming catalyst comprising a carrier containing at least one compound (a) selected from among lanthanum oxide, cerium oxide, and zirconium oxide, manganese oxide (b), and alumina (c), and, supported on the carrier, at least one noble metal component (d) selected from among a ruthenium component, a platinum component, a rhodium component, a palladium component, and an iridium component.

[2] The hydrocarbon reforming catalyst as described in claim 1, wherein the carrier is produced by impregnating an alumina (c) with at least one compound (a') selected from among a lanthanum compound, a cerium compound, and a zirconium compound, and a manganese compound (b'), and calcining the impregnated alumina carrier.

[3] The hydrocarbon reforming catalyst as described in claim 2, which is produced through calcining at 800 to 1,000°C.

[4] The hydrocarbon reforming catalyst as described in claim 1, wherein the carrier is produced by impregnating alumina (c) with at least one compound (a') selected from among a lanthanum compound, a cerium compound, and a zirconium compound; calcining the impregnated alumina carrier at 400 to 600°C; impregnating the calcined carrier with a manganese compound (b'); and calcining the thus-impregnated carrier at 800 to 1,000°C.

[5] The hydrocarbon reforming catalyst as described in claim 1, wherein the amount of at least one compound selected from

among lanthanum oxide, cerium oxide, and zirconium oxide is 1 to 20 mass% with respect to that of the reforming catalyst.

[6] A hydrocarbon reforming catalyst comprising a carrier containing silicon oxide (f), manganese oxide (b), and alumina (c), and, supported on the carrier, at least one noble metal component (d) selected from among a ruthenium component, a platinum component, a rhodium component, a palladium component, and an iridium component.

[7] The hydrocarbon reforming catalyst as described in claim 6, wherein the carrier is produced by impregnating alumina (c) with a silicon compound (f') and calcining the impregnated alumina, and, subsequently, impregnating the calcined alumina with a manganese compound (b') and calcining the thus-impregnated alumina.

[8] The hydrocarbon reforming catalyst as described in claim 6, wherein the carrier is produced by impregnating alumina (c) with a manganese compound (b') and calcining the impregnated alumina, and, subsequently impregnating the calcined alumina with a silicon compound (f') and calcining the thus-impregnated alumina.

[9] The hydrocarbon reforming catalyst as described in claim 6, wherein the carrier is produced by mixing a manganese compound (b') and a silicon compound (f'), impregnating alumina (c) simultaneously with the compounds, and calcining the impregnated alumina.

[10] The hydrocarbon reforming catalyst as described in any one of claims 6 to 9, wherein the silicon compound (f') is

tetraethoxysilane.

[11] The hydrocarbon reforming catalyst as described in any one of claims 6 to 10, which has a silicon oxide (f) content of 1 to 20 mass%.

[0012] The hydrocarbon reforming catalyst as described in any one of claims 1 to 11, wherein the manganese compound (b') is manganese acetate.

[0013] The hydrocarbon reforming catalyst as described in claim 1 or 6, wherein said at least one noble metal component selected from among a ruthenium component, a platinum component, a rhodium component, a palladium component, and an iridium component is contained in the reforming catalyst in an amount of 0.1 to 8 mass% as reduced to noble metal element(s).

[14] The hydrocarbon reforming catalyst as described in claim 1 or 6, wherein the manganese oxide (b) is contained in the reforming catalyst in an amount of 3 to 20 mass%.

[15] The hydrocarbon reforming catalyst as described in any one of claims 1 to 14, which further contains at least one species selected from an alkali metal component and an alkaline earth metal component.

[16] A method for producing hydrogen, characterized by comprising reforming of hydrocarbon by use of a reforming catalyst as recited in any one of claims 1 to 15.

[17]. The method for producing hydrogen as described in claim 16, wherein the reforming is steam reforming, autothermal reforming, partial-oxidation reforming, or carbon

dioxide reforming.

[18] A fuel cell system, characterized by comprising a reformer employing a reforming catalyst as recited in any one of claims 1 to 15, and a fuel cell employing, as a fuel, hydrogen produced by the reformer.